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(54) BACK LIGHT FOR LIQUID CRYSTAL MODULE

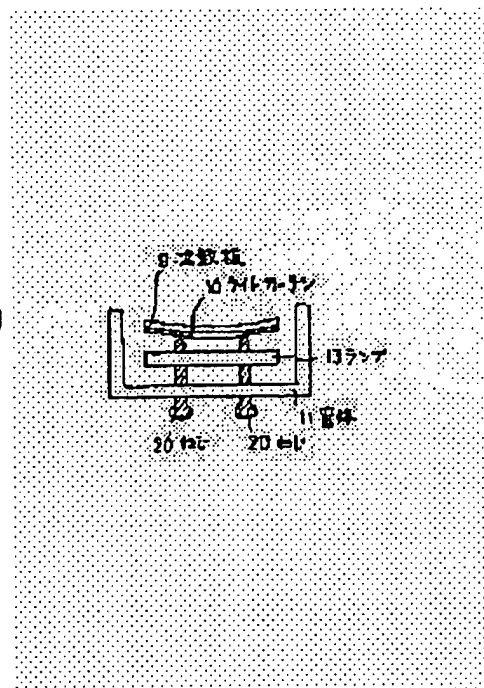
(57)Abstract:

PURPOSE: To eliminate the unequal brightness of a liquid crystal module and to improve the display quality thereof by providing an adjusting means for changing the positions of a light curtain and diffusion plate from the outside of the housing of the back light for the liquid crystal module consisting of the housing internally having a lamp, the light curtain and the diffusion plate.

CONSTITUTION: The lamp 13, the light curtain 10 and the diffusion plate 9 are held within the housing 11. The back light is constituted to irradiate the liquid crystal cell.

The light curtain 10 and the diffusion plate 9 are superposed on each other and are circumferentially adhered and integrated by an adhesive material. Two pieces of screws 20, 20 for adjusting the positions of the

light curtain 10 and the diffusion plate 9 from the outside of the housing 11 are provided through the housing 11. The unequal brightness of the liquid crystal module 15 eliminated when the positions of the light curtain 10 and the diffusion plate 9 are adjusted by these screws 20, 20 in case of a deviation of these positions by thermal deformation.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[Objects of the Invention]

[0001]

[Industrial Application] This invention is a thing about a back light which performs lighting with a lamp in order to give an indication more legible behind a liquid crystal module about the liquid crystal module which performs the two-dimensional display of an alphabetic character, a graphic form, etc., especially a transparency mold liquid crystal module.

[0002]

[Description of the Prior Art] Drawing 4 is the outline perspective view showing the structure of the conventional liquid crystal module. In drawing 4, the electronic circuitry which becomes the periphery of two substrates 1 and the liquid crystal cell 3 which comes to pinch liquid crystal (not shown) among two from TAB-IC4 and the circuit board 5 is connected, and a cel body is constituted. And the maintenance plate 6 is made to meet a cel body, and the periphery of a cel body is held by the bezel 7. Furthermore, the claw part 8 of a bezel 7 is bent under the maintenance plate 6, and a cel body, the maintenance plate 6, and a bezel 7 are unified. On the other hand, the diffusion plate 9 and the light curtain 10 paste up the circumferences, and are embedded by the projection 12 of a case 11 as a unification object at the position of a case 11. Moreover, in the interior of a case 11, two lamps 13 are held in the rubber bush 14, and are installed in a position. And a case 11 is attached in the maintenance plate 6 by the projection 15 of an L type, and is unified as a liquid crystal module.

[0003] The function of the back light which consists of a diffusion plate 9, a light curtain 10, and case 11 grade is giving a uniform light from behind to a cel body by the plane. That is, it is equalized with the light curtain 10 of 0.2 mm thickness, and the light of two lamps 13 is scattered with the diffusion plate 9 of 2 mm thickness. Here, the pattern which becomes a transparent sheet plastic from aluminum foil is formed, and the light curtain 10 is constituted. In the part which there were many patterning parts and separated from just under a lamp 13 in the semantics which interrupts light just under a lamp 13, the transparent part of the configuration of this pattern has increased in order to increase the transmitted light. Consequently, the light curtain 10 can achieve the function which equalizes the amount of lamp lights. Moreover, the diffusion plate 9 has the function which makes light of a lamp 13 the diffused light without directivity.

[0004]

[Problem(s) to be Solved by the Invention] Inside the case 11, the physical relationship of the diffusion plate 9, the light curtain 10, and a lamp 13 equalizes the light of a lamp 13, and serves as a big element which obtains a flat-surface emitter without brightness unevenness. Here, brightness unevenness means that the location which has two lamps 13 on the screen of a liquid crystal cell becomes brighter than other parts, or becomes dark, and does not become uniform brightness.

[0005] By the way, in drawing 4, since the diffusion plate 9 and the light curtain 10 were fixed by adhesion material, when it was exposed to the temperature of 50-60 degrees C, deformation in which the diffusion plate 9 was turned up and the center section was dented according to the difference of heat

expansion of an ingredient as shown in drawing 3 might be carried out. Consequently, since the central part of the light curtain 10 approaches a lamp 13, that part becomes white brightness unevenness brightly. This invention was made in view of such a conventional situation, and aims at offering the approach which should solve brightness unevenness mechanically.

[Elements of the Invention]

[0006]

[Means for Solving the Problem] This invention is a thing about the back light for liquid crystal modules which has the structure which consists of a case which holds a lamp, a light curtain, and a diffusion plate inside, and irradiates a liquid crystal cell, piles up a light curtain and a diffusion plate, holds that perimeter in adhesion material and holds the perimeter of a unification object, and a nothing and this unification object with a case. And the case was penetrated from the exterior of a case and it has a means to change the location of the center section of the unification object which consists of a light curtain and a diffusion plate.

[0007]

[Function] The heat deformation generated in this invention by the unification object which consists of a light curtain and a diffusion plate can be mechanically corrected from the exterior of a case according to **** which penetrates a case.

[0008]

[Example] Hereafter, the detail of this invention is explained with reference to a drawing.

[0009] Drawing 1 is the sectional view showing one example of this invention, and has given the same sign to drawing 4 and a corresponding part. As shown in drawing 1, inside the case 11, the lamp 13, the light curtain 10, and the diffusion plate 9 are held, and it has structure which irradiates a liquid crystal cell (not shown) as a back light. Moreover, the light curtain 10 and the diffusion plate 9 are piled up, paste up the perimeter in adhesion material (not shown), and are using it as the unification object. And a case 11 is penetrated from the exterior of a case 11, and two screw threads 20 and 21 are formed in the case 11 as a means to change the location of the center section of the unification object which consists of a light curtain 10 and a diffusion plate 9.

[0010] Drawing 2 is a principle Fig. for explaining the brightness unevenness in this example, and has given the same sign to drawing 1 and a corresponding part. In drawing 2, brightness unevenness will be the rate of the intensity of light of the direct light a from a lamp 13, and the reflected light b from a lamp 13 to a case 11, if the direct light a becomes strong, it will be brightness unevenness white, and if the reflected light b becomes strong, it will be brightness unevenness black. Therefore, since it will be brightness unevenness white if it becomes short, and the distance of a lamp 13 and the light curtain 10 will be brightness unevenness black if it becomes long, it is necessary to keep this distance suitable.

[0011] Moreover, when the unification object of the light curtain 10 and the diffusion plate 9 is heated in temperature of 50-60 degrees C by the reliability trial according to the difference of the thermal expansion coefficient of the ingredient of the light curtain 10 and the diffusion plate 9, as shown in drawing 1, heat deformation tends to take place. About this point, although there is possibility of solution by selection of the ingredient of the light curtain 10 and the diffusion plate 9, as for the light curtain 10, selection of an ingredient is restricted from the relation of patterning of aluminum foil. On the other hand, in order for an optical element to also join the diffusion plate 9, the selection width of face of an ingredient is narrow. Consequently, it is difficult to make the same the thermal expansion coefficient of the ingredient of the light curtain 10 and the diffusion plate 9. Furthermore, after taking into consideration beforehand the heat deformation generated in the unification object of the light curtain 10 and the diffusion plate 9, it is also difficult [it] to select the thermal expansion coefficient of the ingredient of the light curtain 10 and the diffusion plate 9 so that heat deformation of a top Norikazu object ghost may be lost with heating.

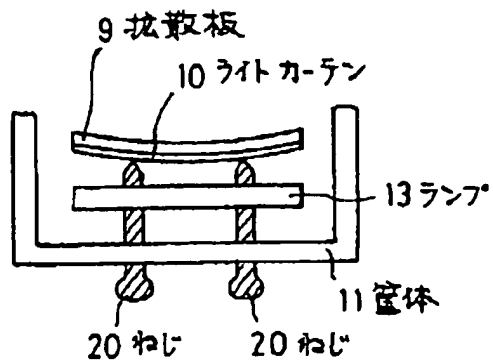
[0012] In this example, the heat deformation in the unification object of the light curtain 10 and the diffusion plate 9 can be corrected by work of two screw threads 20 and 21, and the distance of a lamp 13 and the light curtain 10 can be maintained at the predetermined range. Consequently, a liquid crystal module without brightness unevenness can be obtained.

[0013] In addition, it cannot be overemphasized that a means to change the location of the center section of the unification object which consists of a light curtain 10 and a diffusion plate 9 is not what is restricted to the gestalt of the example shown in drawing 1.

[0014]

[Effect of the Invention] Since this invention is equipped with a means to penetrate said case and to change the location of the center section of said unification object from the exterior of a case, it can obtain a liquid crystal module with good display grace without brightness unevenness.

[Translation done.]

Drawing selection Representative drawing ▼

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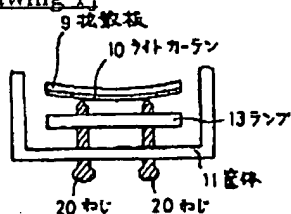
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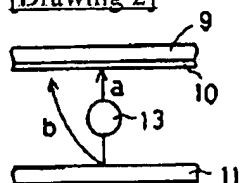
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DRAWINGS

[Drawing 1]



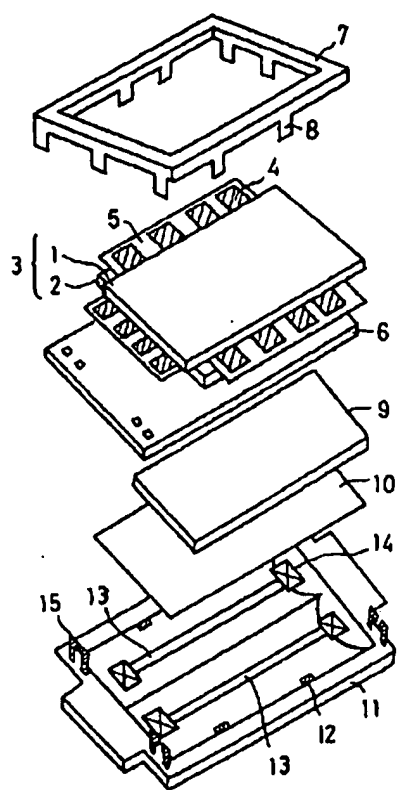
[Drawing 2]



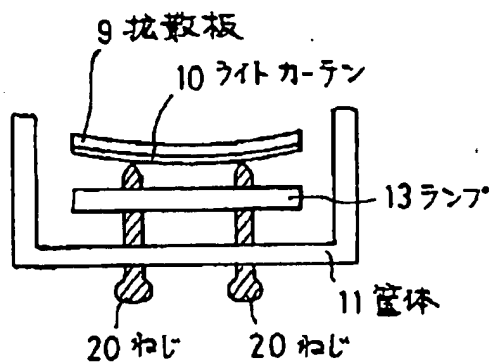
[Drawing 3]



[Drawing 4]



[Translation done.]

Drawing selection Representative drawing

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